

299-W15-77 (A7378) Log Data Report

Borehole Information:

Borehole: 299-W15-77 (A7378)			Site: 216-Z-7 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: Not applicable	GWL Date: none			
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type	
135903.414 m	566677.073 m	07/51	668.24 ft	72	Cable	

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	1.8	8 5/8	7 13/16	13/32	1.8	72

Borehole Notes:

The logging engineer used a steel tape to measure the casing diameter and stickup. Before logging, the borehole was swabbed for contamination and none was detected.

Hanford Wells (Chamness and Merz 1993) indicated the borehole was drilled in 1951 to a depth of 72 ft.

Logging Equipment Information:

Logging System: Gamma 2A	Type: SGLS (35%) 34TP20893A
Calibration Date: 03/04	Calibration Reference: DOE-EM/GJ642-2004
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat		
Date	07/20/04	07/21/04	07/21/04		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	40.0	71.0	38.0		
Finish Depth (ft)	2.0	39.0	30.0		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A ³	N/A	N/A		
Pre-Verification	BA371CAB	BA373CAB	BA373CAB		
Start File	BA372000	BA373000	BA373033		
Finish File	BA372038	BA373032	BA373041		
Post-Verification	BA372CAA	BA373CAA	BA373CAA		
Depth Return	0	N/A	0		

Log Run	1	2	3 Repeat		
Error (in.)					
Comments	Fine-gain adjustment after file 028.	No fine-gain adjustment.	No fine-gain adjustment.		

Logging Operation Notes:

Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K , ^{238}U , and ^{232}Th) verifier with serial number 082.

Analysis Notes:

Analyst:	Henwood	Date:	09/22/04	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. Examinations of spectra indicate that the detectors functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations for SGLS spectra were calculated in EXCEL (source file: G2AMar04.xls). A casing thickness of 0.40625 in. was applied to the data. No dead time or water corrections were required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

A comparison plot of the Westinghouse Hanford Company Radionuclide Logging System (RLS) data acquired in 1995 with the current SGLS data is included. An historical gross gamma logging plot has been copied from Fecht et al. (1977) and digitized. This log is plotted with the current SGLS total gamma log.

Results and Interpretations:

^{137}Cs was the man-made radionuclide detected in this borehole. ^{137}Cs was detected at 0.5 pCi/g at the ground surface and at a isolated location near its MDL of 0.2 pCi/g at 21 ft.

A comparison plot of RLS data acquired in 1995 with the current SGLS data is included. The RLS data were decayed to the date of the SGLS log data. ^{60}Co was detected with the RLS in 1995 near the bottom of the borehole at concentrations less than 1 pCi/g. Spectra from the current SGLS data suggest a hint of ^{60}Co at the 1333-keV energy peak, although a confirming peak at 1173 keV could not be observed. It is likely ^{60}Co exists below the MDL of approximately 0.15 pCi/g. The low-level contamination has apparently

decayed away since 1995, which is almost two half-lives of decay for ^{60}Co . The ^{137}Cs detected near the surface by the RLS was also detected by the SGLS.

A plot of an historical gross gamma log acquired in this borehole in 1976 is included (Fecht et al. 1977). In 1976, elevated gamma activity appears to have existed near the bottom of the borehole where the RLS detected ^{60}Co contamination in 1995. The similar total gamma profiles suggest contaminant stability in the vadose zone since 1976.

The ^{40}K and ^{232}Th logs show some variations in concentrations, suggesting lithology changes that may be correlated with adjacent boreholes.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

Fecht, K.R., G.V. Last, and K.R. Price, 1977. *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

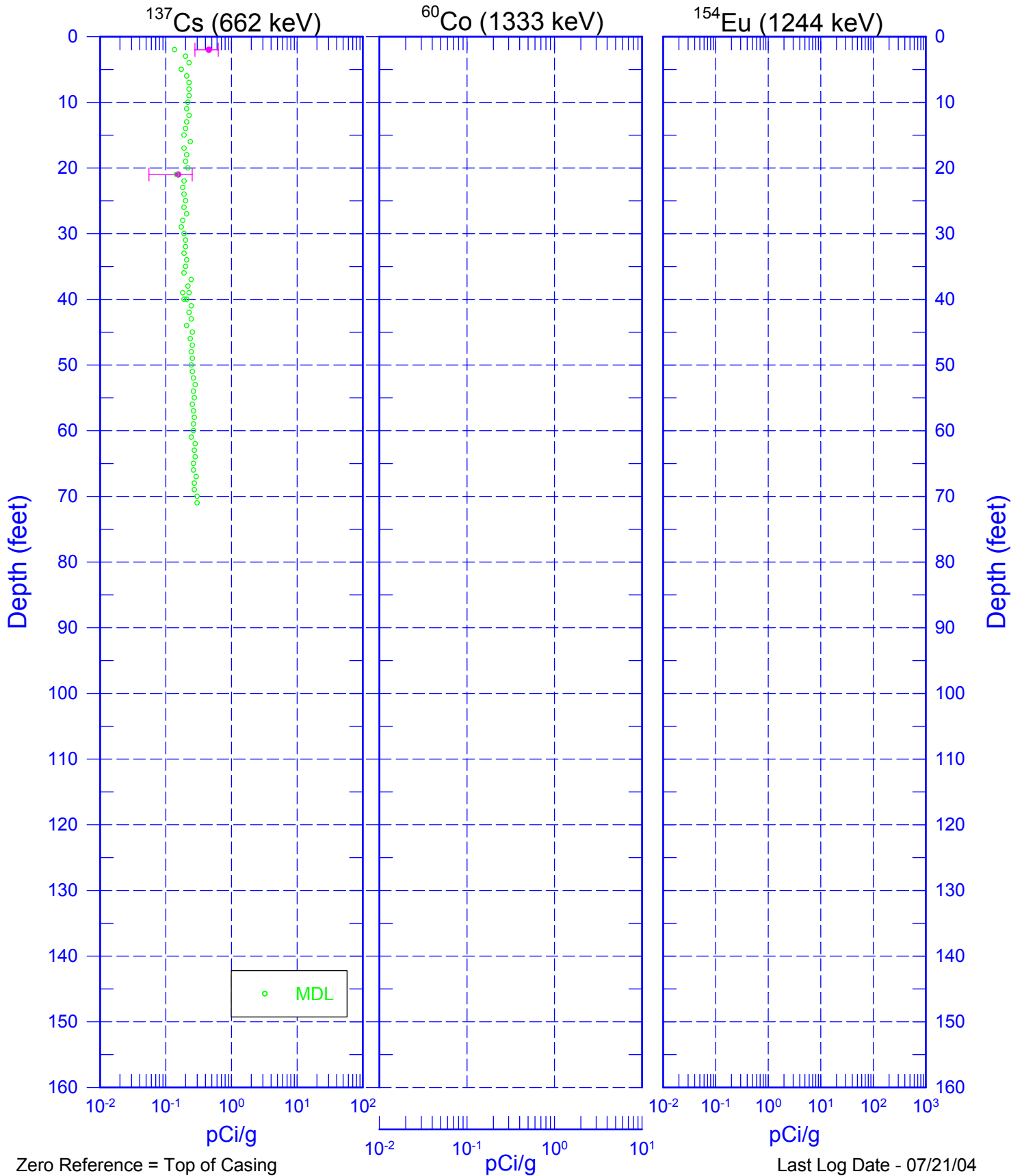
¹ GWL – groundwater level

² TOC – top of casing

³ N/A – not applicable

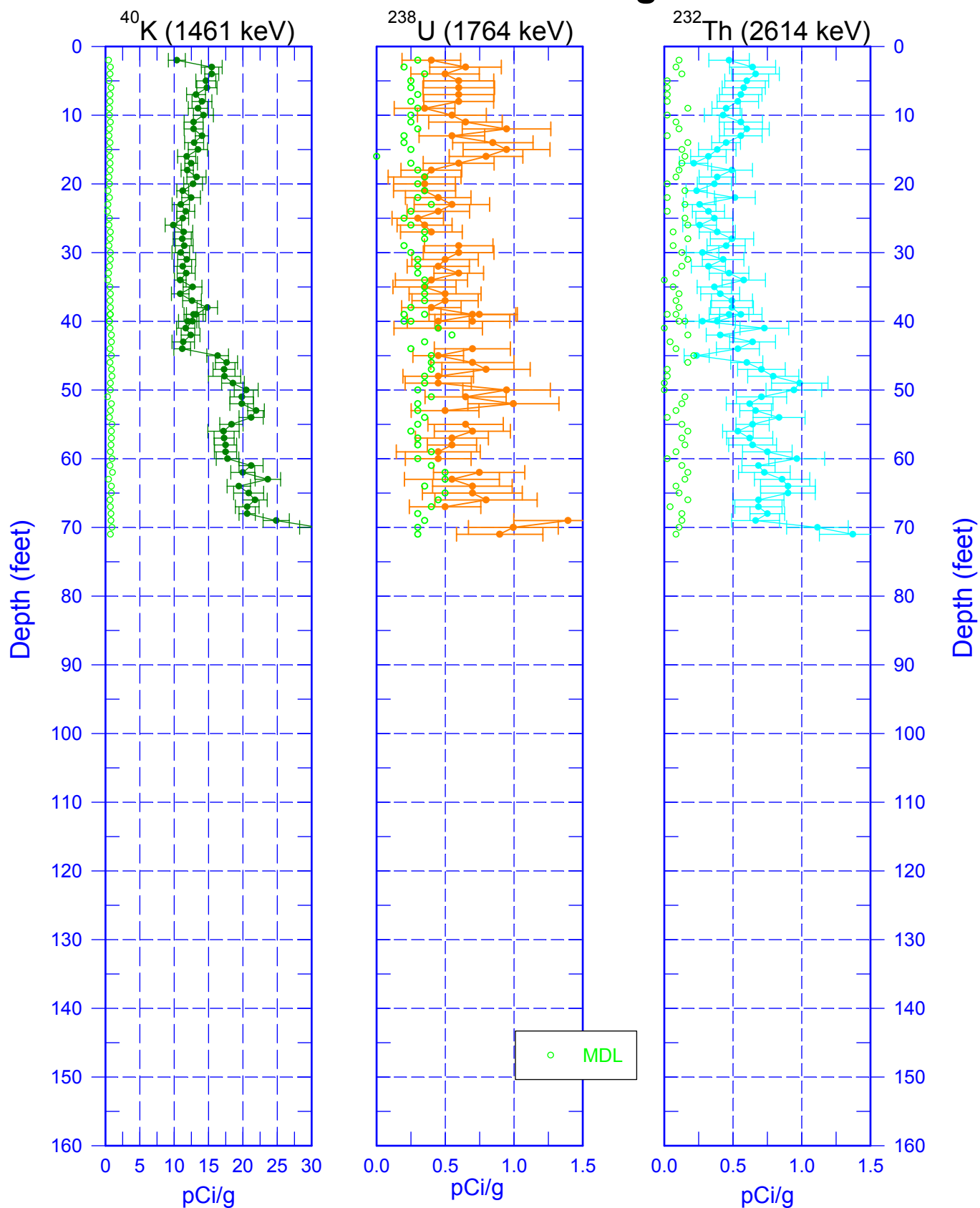
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Man-Made Radionuclides



299-W15-77 (A7378)

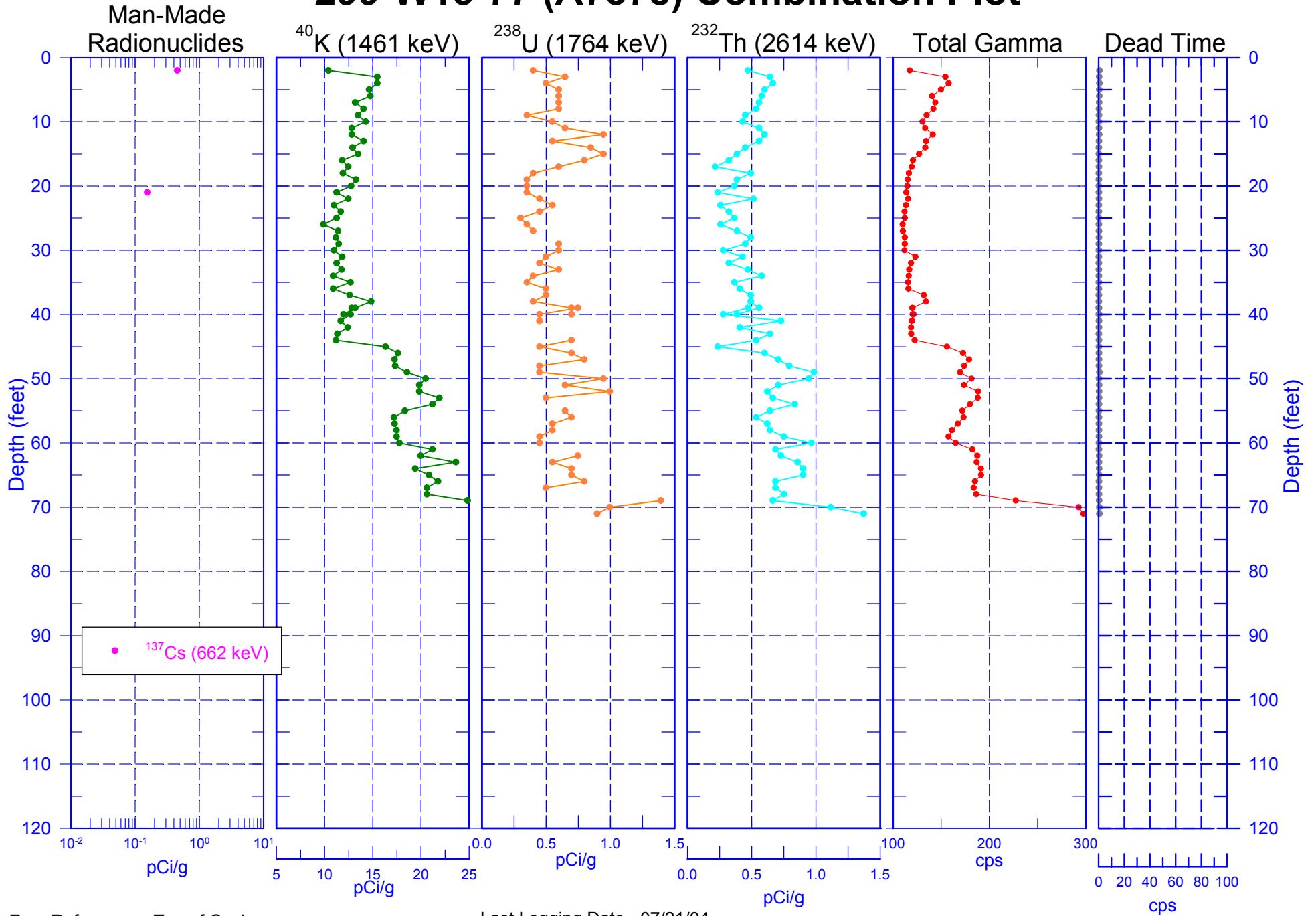
Natural Gamma Logs



Zero Reference = Top of Casing

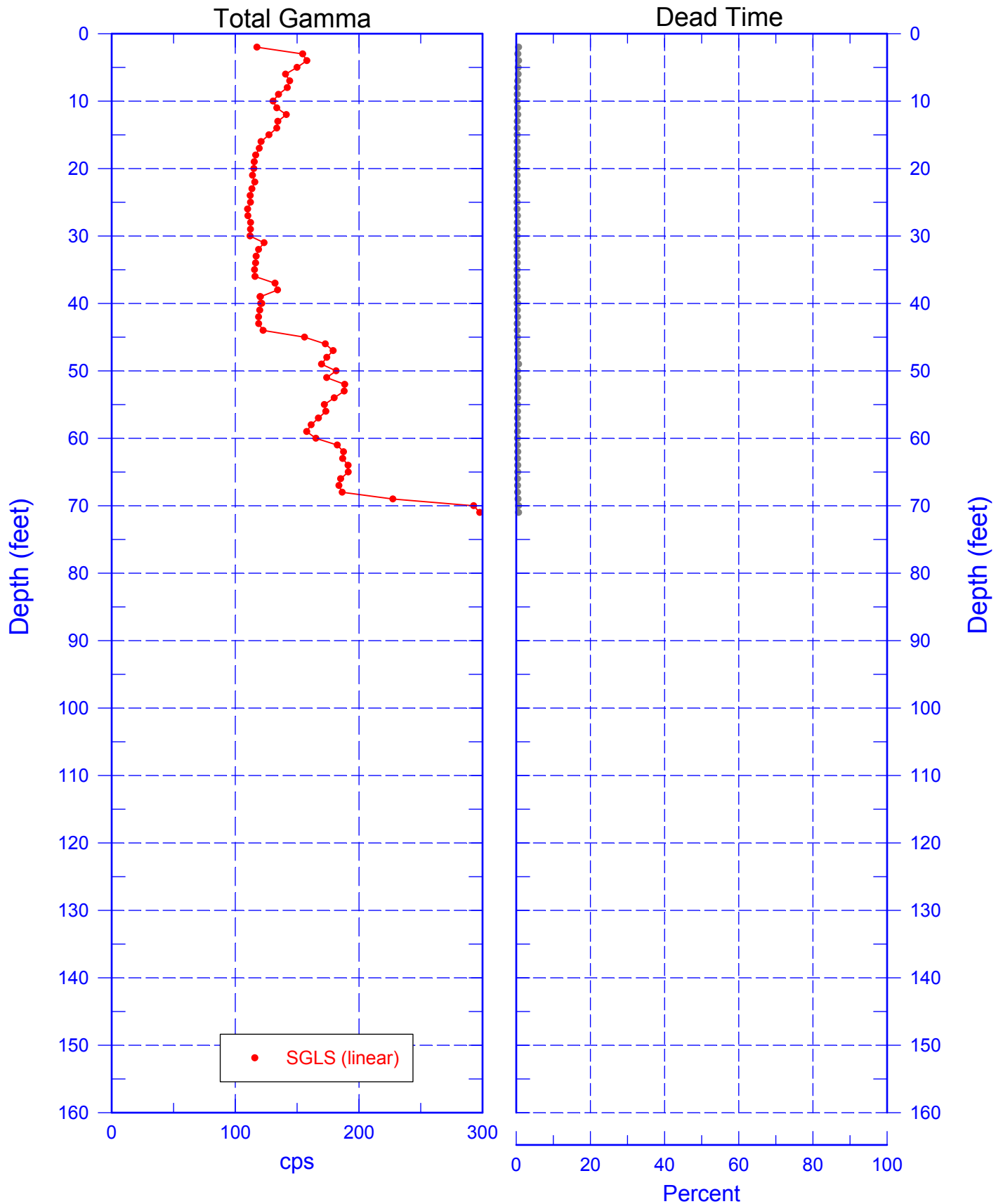
Last Log Date - 07/21/04

299-W15-77 (A7378) Combination Plot



299-W15-77 (A7378)

Total Gamma & Dead Time

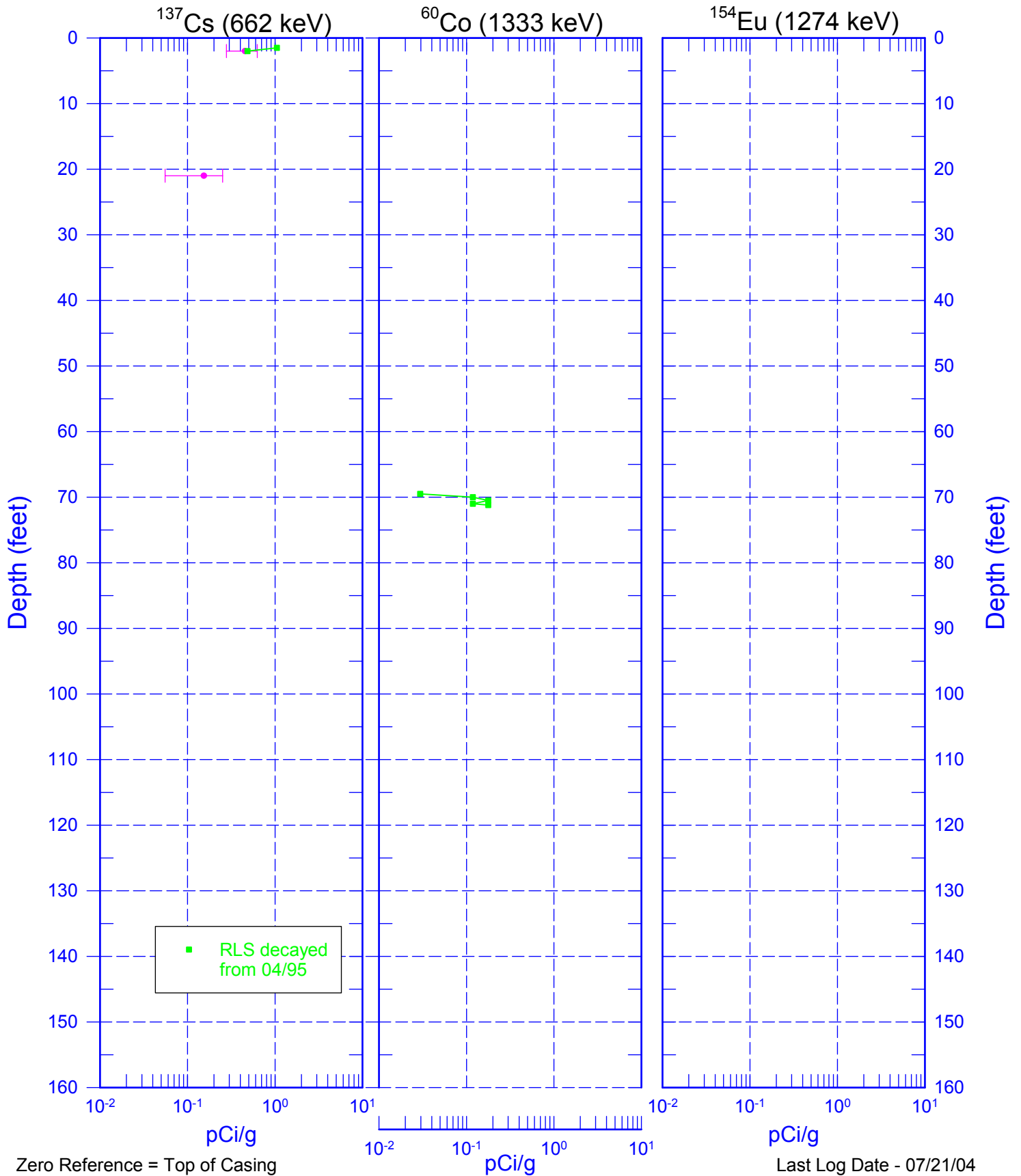


Zero Reference = Top of Casing

Last Logging Date - 07/21/04

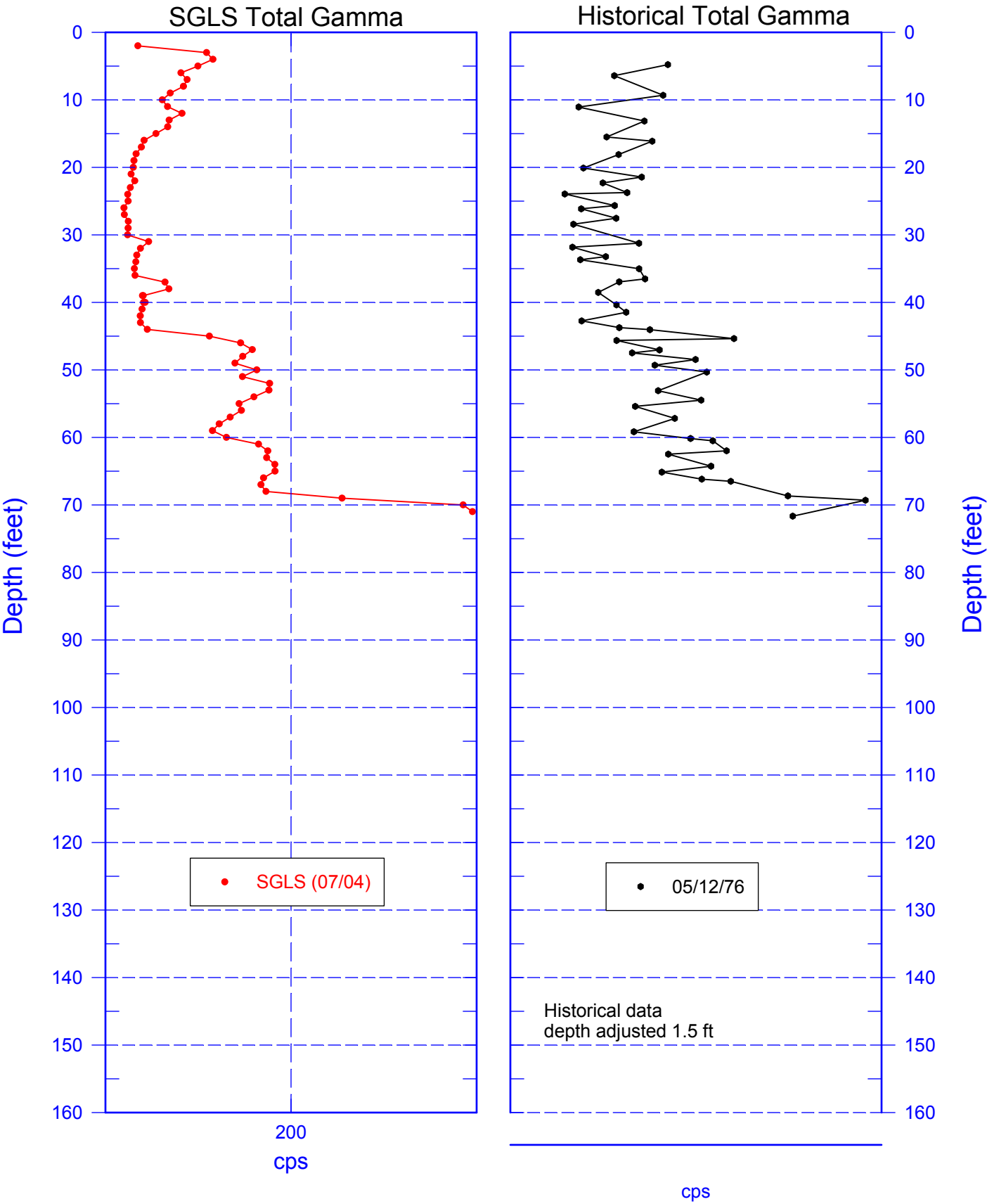
299-W15-77 (A7378)

Man-Made Radionuclide Comparison



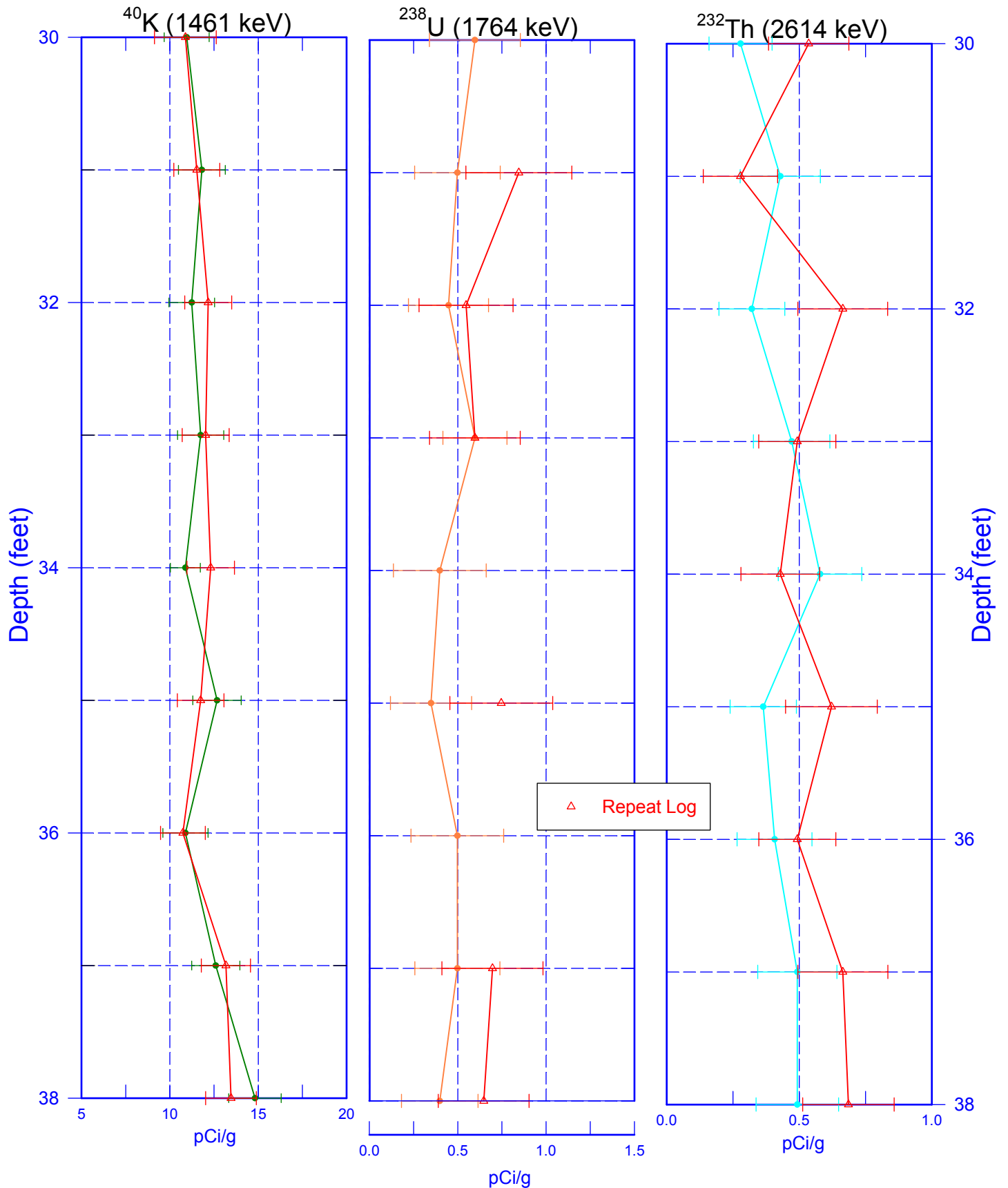
299-W15-77 (A7378)

Total Gamma



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Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

Last Log Date - 07/21/04